ABSTRACT OF THE DISCLOSURE

A system and method for managing utilization in a unidirectional stack. An application programming interface (API) is provided for facilitating user interaction with a stack management system associated with a computing environment such as an architectural simulator. The unidirectional stack is initialized via the API with respect to a fixed stack marker boundary, a stack base and a stack pointer. A high water mark is maintained for tracking the stack pointer's farthest location from the stack base during the execution of a program. When a program instruction is operable to access a stack location, one or more validity rules are applied to determine if the access operation is permissible. Where the program instruction is operable to modify the stack pointer, another set of validity rules are applied to determine if the stack pointer operation is permissible. User warning and optional return of program control are available when an invalid access operation or stack pointer operation is attempted.